EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	("3489795").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L2	2	("5054611").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L3	2	("6054611").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L4	2	("5608105").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L5	3	("3085071").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L6	58077	formate	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L7	904	levulinate	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L8	304	L6 and L7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L9	215	L6 same L7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L10	771683	fuel	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L11	753021	$fuel	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41

EAST Search History

L12	772434	L10 or L11	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L13	6	L9 and L12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L14	40	L7 and L12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L15	3	"5,189,215"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L16	53	levulinic adj ester	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L17	3	"9421753"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L18	264478	alkene or olefin	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L19	153	L8 and L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L20	2256	levulinic	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L21	4	L20 near5 L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L22	4	"5290325"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L23	2	"5892107".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41

EAST Search History

L24	3257	levulin$	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L25	197	560/247.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L26	613	560/174.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L27	8	L26 and L25	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L28	0	L27 and L24	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L29	98934	gasoline	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L30	815461	L12 or L29	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L31	7	("2118506").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L32	5	L20 near10 L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L33	7	L20 near15 L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L34	9	L8 and L30	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41

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NEWS 3	JAN 17	Pre-1988 INPI data added to MARPAT
NEWS 4	FEB 21	STN AnaVist, Version 1.1, lets you share your STN AnaVist visualization results
NEWS 5	FEB 22	The IPC thesaurus added to additional patent databases on STN
NEWS 6	FEB 22	Updates in EPFULL; IPC 8 enhancements added
NEWS 7	FEB 27	New STN AnaVist pricing effective March 1, 2006
NEWS 8	MAR 03	Updates in PATDPA; addition of IPC 8 data without attributes
NEWS 9	MAR 22	EMBASE is now updated on a daily basis
NEWS 10	APR 03	New IPC 8 fields and IPC thesaurus added to PATDPAFULL
NEWS 11	APR 03	Bibliographic data updates resume; new IPC 8 fields and IPC thesaurus added in PCTFULL
NEWS 12	APR 04	STN AnaVist $500 visualization usage credit offered
NEWS 13	APR 12	LINSPEC, learning database for INSPEC, reloaded and enhanced
NEWS 14	APR 12	Improved structure highlighting in FQHIT and QHIT display in MARPAT
NEWS 15	APR 12	Derwent World Patents Index to be reloaded and enhanced during second quarter; strategies may be affected
NEWS 16	MAY 10	CA/CAplus enhanced with 1900-1906 U.S. patent records
NEWS 17	MAY 11	KOREAPAT updates resume
NEWS 18	MAY 19	Derwent World Patents Index to be reloaded and enhanced
NEWS 19	MAY 30	IPC 8 Rolled-up Core codes added to CA/CAplus and USPATFULL/USPAT2
NEWS 20	MAY 30	The F-Term thesaurus is now available in CA/CAplus
NEWS 21	JUN 02	The first reclassification of IPC codes now complete in INPADOC

NEWS EXPRESS JUNE 16 CURRENT WINDOWS VERSION IS V8.01b, CURRENT MACINTOSH VERSION IS V6.0c(ENG) AND V6.0Jc(JP), AND CURRENT DISCOVER FILE IS DATED 23 MAY 2006.

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FILE 'HOME' ENTERED AT 06:45:04 ON 21 JUN 2006

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=> file caplus
COST IN U.S. DOLLARS                                    SINCE FILE      TOTAL
                                                           ENTRY    SESSION
FULL ESTIMATED COST                                         0.21       0.21

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FILE LAST UPDATED: 20 Jun 2006  (20060620/ED)

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=> levulinate
          1201 LEVULINATE
            80 LEVULINATES
L1        1239 LEVULINATE
                 (LEVULINATE OR LEVULINATES)

=> formate
         40402 FORMATE
          3436 FORMATES
L2       41682 FORMATE
                 (FORMATE OR FORMATES)

=> l1 and l2
L3          47 L1 AND L2

=> gasoline
         69748 GASOLINE
          5471 GASOLINES
L4       70183 GASOLINE
                 (GASOLINE OR GASOLINES)

=> fuls
             3 FULS
             1 FULSES
L5           4 FULS
                 (FULS OR FULSES)

=> fuel
        378524 FUEL
        162750 FUELS
L6      429770 FUEL
                 (FUEL OR FUELS)

=> ?fuel
L7      379639 ?FUEL
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=> l6 or l7
L8 430585 L6 OR L7

=> l4 or l8
L9 477388 L4 OR L8

=> l3 and l9
L10 4 L3 AND L9

=> d l10 1-4 ti fbib abs

L10 ANSWER 1 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinic acid esters and **formate** esters as **gasoline** and diesel **fuel** additives prepared from α-angelica lactone
AN 2005:698416 CAPLUS
DN 143:196535
TI Levulinic acid esters and **formate** esters as **gasoline** and diesel **fuel** additives prepared from α-angelica lactone
IN Manzer, Leo Ernest
PA USA
SO U.S. Pat. Appl. Publ., 16 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 2005171374	A1	20050804	US 2004-768276	20040130
WO 2005075405	A1	20050818	WO 2005-US2744	20050128

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

US 2004-768276 A 20040130

OS MARPAT 143:196535
AB **Fuels** and **fuel** additives are levulinic acid esters prepared by reaction of α-angelica lactone (i.e., 5-methyl-2(3H)-furanone) with olefins of general formula R1R2C=CR3R4, in the presence of an aqueous acid catalyst, to form esters with general structures CH3-C(:O)-(CH2)2-C(:O)-O-CR1R2-CHR3R4 or CH3-C(:O)-(CH2)2-C(:O)-O-CR3R4.2-CHR1R2 (R1,R2,R3,R4 are H, C1-10-substituted or -unsubstituted alkyl, C3-20-cycloalkyl (in which ≥2 can form a cyclic or bicyclic alkyl), such that the total number of carbon atoms is ≤22). In addition, formic acid may be added to the α-angelica lactone-containing reaction mixture to form **formate** esters of general structures HC(:O)-O-CR1R2-CHR3R4 and HC(:O)-O-CR3R4-CHR1R2, in which R1, R2, R3, and R4 are as described above. α-Angelica lactone is typically prepared by aqueous acid hydrolysis of biomass at 0.69-13.8 MPa and 200-250°.

L10 ANSWER 2 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinic and formic acid esters, as **gasoline** and diesel **fuel** oxygenate additives, prepared from biomass by hydrolysis and esterification with olefins
AN 2003:818512 CAPLUS
DN 139:294305
TI Levulinic and formic acid esters, as **gasoline** and diesel **fuel** oxygenate additives, prepared from biomass by hydrolysis and

esterification with olefins
IN Fagan, Paul Joseph; Korovessi, Ekaterini; Manzer, Leo E.; Mehta, Rakesh; Thomas, Stuart M.
PA E. I. Du Pont de Nemours & Co., USA
SO PCT Int. Appl., 28 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
PI WO 2003085071	A1	20031016	WO 2003-US9853		20030401
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW					
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG					
			US 2002-369380P	P	20020401
CA 2479531	AA	20031016	CA 2003-2479531		20030401
			US 2002-369380P	P	20020401
			WO 2003-US9853	W	20030401
AU 2003224812	A1	20031020	AU 2003-224812		20030401
			US 2002-369380P	P	20020401
			WO 2003-US9853	W	20030401
US 2003233011	A1	20031218	US 2003-404322		20030401
			US 2002-369380P	P	20020401
EP 1490457	A1	20041229	EP 2003-721503		20030401
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK					
			US 2002-369380P	P	20020401
			WO 2003-US9853	W	20030401
US 2005118691	A1	20050602	US 2003-507062		20030401
			US 2002-369380P	P	20020401
			WO 2003-US9853	W	20030401
CN 1643116	A	20050720	CN 2003-807436		20030401
			US 2002-369380P	P	20020401
JP 2005521748	T2	20050721	JP 2003-582252		20030401
			US 2002-369380P	P	20020401
			WO 2003-US9853	W	20030401

OS MARPAT 139:294305
AB Levulinic acid esters and **formate** esters are prepared from biomass by aqueous acid hydrolysis of biomass, to form a first reaction mixture (containing levulinic acid, formic acid, and furfural) and a solid phase, which is separated After removal of furfural from the solid-free liquid phase. the liquid phase is reacted with an olefin in the presence of a second acid catalyst, to produce an organic phase containing **levulinate** esters and **formate** esters, which are separated from the other components. Furfural is preferably separated by liquid-liquid solvent extraction Both acid catalysts (i.e., the initial hydrolysis catalyst and the esterification catalyst) are soluble acids with pKa of <4 or a heterogeneous solid acid with H0 ≤2. The **levulinate** and **formate** esters are useful as **gasoline** antiknock additives, diesel **fuel** additives (e.g., cetane number improvers), and additives for biofuels, especially biodiesel and biodiesel-conventional diesel **fuel** blends.
RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 3 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN
TI **Levulinate** esters from biomass wastes
AN 2001:412995 CAPLUS
DN 135:138980
TI **Levulinate** esters from biomass wastes
AU Olson, Edwin S.; Kjelden, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.
CS The Energy and Environmental Research Center, University of North Dakota, Grand Forks, ND, 58202-9018, USA
SO ACS Symposium Series (2001), 784(Chemicals and Materials from Renewable Resources), 51-63
CODEN: ACSMC8; ISSN: 0097-6156
PB American Chemical Society
DT Journal
LA English
AB The conversion of resin-bonded furniture and building waste to **levulinate** esters was studied with a view to producing **fuels**, solvents, and chemical intermediates and other useful byproducts in an inexpensive process. The acid-catalyzed reaction of cellulosic materials with ethanol or methanol at 200° gives good yields of **levulinate** and **formate** esters. A solid residue (charcoal) and a resinous lignin residue are also obtained. The excess alc. solvent is recycled. An advantage of the reaction in alc. is that wastewater is minimized and products are purified easily by distillation of the esters. Methanol and ethanol, which give the highest yields of **levulinate** esters, can be obtained at a low production cost. These esters are therefore the preferred intermediates for conversion to many other products. The Et ester was converted in high yield to a number of other esters by Fischer esterification. The resulting ketoesters are substrates for a variety of condensation and addition reactions at the ester and keto groups. A market for these higher-value products is needed to justify the process cost.
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 4 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN
TI **Levulinate** ester intermediates from biomass.
AN 1999:539847 CAPLUS
TI **Levulinate** ester intermediates from biomass.
AU Olson, Edwin S.; Kjelden, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.
CS Energy & Environmental Research Center, University of North Dakota, Grand Forks, ND, 58202-9018, USA
SO Book of Abstracts, 218th ACS National Meeting, New Orleans, Aug. 22-26 (1999), CELL-013 Publisher: American Chemical Society, Washington, D. C.
CODEN: 67ZJA5
DT Conference; Meeting Abstract
LA English
AB The direct conversion of waste biomass to **levulinate** esters has been further investigated with the view to producing **fuels**, solvents, and chemical intermediates as well as other useful byproducts in an inexpensive process. The acid-catalyzed reaction of cellulosic materials with ethanol or methanol at 200C gives good yields of **levulinate** and **formate** esters. A solid residue (charcoal) and a resinous lignin residue are also obtained. The excess alc. solvent is recycled. An advantage of the reaction in alc. is that wastewater is minimized and products are purified easily by distillation of the esters. Methanol and ethanol give the highest yields of **levulinate** esters and can be obtained at low cost of production These esters are, therefore, preferred intermediates for conversion to many other products. The Et ester has been converted in high yield to a number of other esters by Fischer esterification. The resulting ketoesters are substrates for a variety of condensation and addition reactions at the ester and keto groups.

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COST IN U.S. DOLLARS                                    SINCE FILE      TOTAL
                                                           ENTRY    SESSION
FULL ESTIMATED COST                                        26.80      27.01

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)              SINCE FILE      TOTAL
                                                           ENTRY    SESSION
CA SUBSCRIBER PRICE                                        -3.00      -3.00

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SESSION RESUMED IN FILE 'CAPLUS' AT 07:15:36 ON 21 JUN 2006
FILE 'CAPLUS' ENTERED AT 07:15:36 ON 21 JUN 2006
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COST IN U.S. DOLLARS                                    SINCE FILE      TOTAL
                                                           ENTRY    SESSION
FULL ESTIMATED COST                                        26.80      27.01

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)              SINCE FILE      TOTAL
                                                           ENTRY    SESSION
CA SUBSCRIBER PRICE                                        -3.00      -3.00

=> d his

     (FILE 'HOME' ENTERED AT 06:45:04 ON 21 JUN 2006)

     FILE 'CAPLUS' ENTERED AT 06:45:16 ON 21 JUN 2006
L1          1239 LEVULINATE
L2         41682 FORMATE
L3            47 L1 AND L2
L4         70183 GASOLINE
L5             4 FULS
L6        429770 FUEL
L7        379639 ?FUEL
L8        430585 L6 OR L7
L9        477388 L4 OR L8
L10            4 L3 AND L9

=> Levulin?
L11        4975 LEVULIN?

=> form?
SYSTEM LIMITS EXCEEDED - SEARCH ENDED
The search profile you entered was too complex or gave too many
answers.  Simplify or subdivide the query and try again.  If you have
exceeded the answer limit, enter DELETE HISTORY at an arrow prompt
(=>) to remove all previous answers sets and begin at L1.  Use the
SAVE command to store any important profiles or answer sets before
using DELETE HISTORY.

=> formic or formate
         46690 FORMIC
         40402 FORMATE
```

```
          3436 FORMATES
         41682 FORMATE
                 (FORMATE OR FORMATES)
L12      79846 FORMIC OR FORMATE

=> l11(l)l12
L13        178 L11(L)L12

=> l9 an l13
MISSING OPERATOR L9 AN
The search profile that was entered contains terms or
nested terms that are not separated by a logical operator.

=>
=> l9 and l13
L14          8 L9 AND L13

=> d l14 1-8 ti

L14  ANSWER 1 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   The biofine technology: a "bio-refinery" concept based on thermochemical
     conversion of cellulosic biomass

L14  ANSWER 2 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinic acid esters and formate esters as
     gasoline and diesel fuel additives prepared from
     α-angelica lactone

L14  ANSWER 3 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinic acid. A highly versatile chemical product from papermaking
     sludge and from biomass

L14  ANSWER 4 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   The Biofine process: A biorefinery concept based on thermochemical
     conversion of biomass

L14  ANSWER 5 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinic and formic acid esters, as gasoline
     and diesel fuel oxygenate additives, prepared from biomass by
     hydrolysis and esterification with olefins

L14  ANSWER 6 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinate esters from biomass wastes

L14  ANSWER 7 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Effect of organic acids on the growth and fermentation of ethanologenic
     Escherichia coli LY01

L14  ANSWER 8 OF 8  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinate ester intermediates from biomass.


=> alkene or olefin
         34514 ALKENE
         82388 ALKENES
         94660 ALKENE
                 (ALKENE OR ALKENES)
         98346 OLEFIN
        101280 OLEFINS
        153830 OLEFIN
                 (OLEFIN OR OLEFINS)
L15     207935 ALKENE OR OLEFIN

=> l14 and l15
L16          2 L14 AND L15
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=> d l16 1-2 ti fbib abs

L16 ANSWER 1 OF 2 CAPLUS COPYRIGHT 2006 ACS on STN
TI **Levulinic** acid esters and **formate** esters as **gasoline** and diesel **fuel** additives prepared from α-angelica lactone
AN 2005:698416 CAPLUS
DN 143:196535
TI **Levulinic** acid esters and **formate** esters as **gasoline** and diesel **fuel** additives prepared from α-angelica lactone
IN Manzer, Leo Ernest
PA USA
SO U.S. Pat. Appl. Publ., 16 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2005171374	A1	20050804	US 2004-768276	20040130
WO 2005075405	A1	20050818	WO 2005-US2744	20050128

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

US 2004-768276 A 20040130

OS MARPAT 143:196535
AB **Fuels** and **fuel** additives are **levulinic** acid esters prepared by reaction of α-angelica lactone (i.e., 5-methyl-2(3H)-furanone) with **olefins** of general formula R1R2C=CR3R4, in the presence of an aqueous acid catalyst, to form esters with general structures CH3-C(:O)-(CH2)2-C(:O)-O-CR1R2-CHR3R4 or CH3-C(:O)-(CH2)2-C(:O)-O-CR3R4.2-CHR1R2 (R1,R2,R3,R4 are H, C1-10-substituted or -unsubstituted alkyl, C3-20-cycloalkyl (in which ≥2 can form a cyclic or bicyclic alkyl), such that the total number of carbon atoms is ≤22). In addition, **formic** acid may be added to the α-angelica lactone-containing reaction mixture to form **formate** esters of general structures HC(:O)-O-CR1R2-CHR3R4 and HC(:O)-O-CR3R4-CHR1R2, in which R1, R2, R3, and R4 are as described above. α-Angelica lactone is typically prepared by aqueous acid hydrolysis of biomass at 0.69-13.8 MPa and 200-250°.

L16 ANSWER 2 OF 2 CAPLUS COPYRIGHT 2006 ACS on STN
TI **Levulinic** and **formic** acid esters, as **gasoline** and diesel **fuel** oxygenate additives, prepared from biomass by hydrolysis and esterification with **olefins**
AN 2003:818512 CAPLUS
DN 139:294305
TI **Levulinic** and **formic** acid esters, as **gasoline** and diesel **fuel** oxygenate additives, prepared from biomass by hydrolysis and esterification with **olefins**
IN Fagan, Paul Joseph; Korovessi, Ekaterini; Manzer, Leo E.; Mehta, Rakesh; Thomas, Stuart M.
PA E. I. Du Pont de Nemours & Co., USA
SO PCT Int. Appl., 28 pp.
CODEN: PIXXD2

DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
PI	WO 2003085071	A1	20031016	WO 2003-US9853		20030401
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW					
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG					
				US 2002-369380P	P	20020401
	CA 2479531	AA	20031016	CA 2003-2479531		20030401
				US 2002-369380P	P	20020401
				WO 2003-US9853	W	20030401
	AU 2003224812	A1	20031020	AU 2003-224812		20030401
				US 2002-369380P	P	20020401
				WO 2003-US9853	W	20030401
	US 2003233011	A1	20031218	US 2003-404322		20030401
				US 2002-369380P	P	20020401
	EP 1490457	A1	20041229	EP 2003-721503		20030401
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK					
				US 2002-369380P	P	20020401
				WO 2003-US9853	W	20030401
	US 2005118691	A1	20050602	US 2003-507062		20030401
				US 2002-369380P	P	20020401
				WO 2003-US9853	W	20030401
	CN 1643116	A	20050720	CN 2003-807436		20030401
				US 2002-369380P	P	20020401
	JP 2005521748	T2	20050721	JP 2003-582252		20030401
				US 2002-369380P	P	20020401
				WO 2003-US9853	W	20030401

OS MARPAT 139:294305

AB **Levulinic** acid esters and **formate** esters are prepared from biomass by aqueous acid hydrolysis of biomass, to form a first reaction mixture (containing **levulinic** acid, **formic** acid, and furfural) and a solid phase, which is separated After removal of furfural from the solid-free liquid phase. the liquid phase is reacted with an **olefin** in the presence of a second acid catalyst, to produce an organic phase containing **levulinate** esters and **formate** esters, which are separated from the other components. Furfural is preferably separated by liquid-liquid solvent extraction Both acid catalysts (i.e., the initial hydrolysis catalyst and the esterification catalyst) are soluble acids with pKa of <4 or a heterogeneous solid acid with H0 ≤2. The **levulinate** and **formate** esters are useful as **gasoline** antiknock additives, diesel **fuel** additives (e.g., cetane number improvers), and additives for biofuels, especially biodiesel and biodiesel-conventional diesel **fuel** blends.

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> l14 not l16
L17 6 L14 NOT L16

=> d l17 1-6 ti fbib abs

L17 ANSWER 1 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN
TI The biofine technology: a "bio-refinery" concept based on thermochemical conversion of cellulosic biomass
AN 2006:163347 CAPLUS
TI The biofine technology: a "bio-refinery" concept based on thermochemical conversion of cellulosic biomass
AU Fitzpatrick, Stephen W.
CS Biofine Technologies LLC, Waltham, MA, 02451, USA
SO ACS Symposium Series (2006), 921(Feedstocks for the Future), 271-287
CODEN: ACSMC8; ISSN: 0097-6156
PB American Chemical Society
DT Journal
LA English
AB The Biofine process is a high temperature, dilute acid-catalyzed rapid hydrolysis of lignocellulosic biomass. The process refines the biomass feed into four products: **Levulinic** acid, a versatile platform chemical, **formic** acid and furfural, commodity chems. and a carbonaceous powder that can be burned or gasified to produce steam and elec. power. The process is carried out in a reactor system that enhances the yield of the major products making it com. viable. The process is flexible enough to utilize a wide range of lignocellulose. Derivative products of interest include automotive **fuels**, monomers, herbicides and general chems. A com. scale process is now under construction. The process could potentially allow biomass to displace crude oil as the primary source of **fuels** and chems.
RE.CNT 49 THERE ARE 49 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 2 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinic acid. A highly versatile chemical product from papermaking sludge and from biomass
AN 2004:667745 CAPLUS
DN 142:200444
TI Levulinic acid. A highly versatile chemical product from papermaking sludge and from biomass
AU Fugalli, Serena
CS Le Calorie Srl, Caserta, Italy
SO Chimica e l'Industria (Milan, Italy) (2004), 86(2), 56-59
CODEN: CINMAB; ISSN: 0009-4315
PB Editrice Bias Sas
DT Journal
LA Italian
AB An innovative technol. process to transform cellulosic wastes, from, e.g., plant residues, papermaking sludges, sawdust and wood shop cuttings, etc., into levulinic acid (LA) was developed at Le Calorie, Caserta, Italy. The process is based on acid hydrolysis using heat, water, and a diluted mineral acid to convert cellulose from various sources into LA. LA is of interest as feedstock for production of several high value derivs., especially esters for use as, e.g., solvents, chems., bio-herbicides; bio-pesticides, **fuel** additives, specialty monomers, resins, and plastics.

L17 ANSWER 3 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN
TI The Biofine process: A biorefinery concept based on thermochemical conversion of biomass
AN 2004:222219 CAPLUS
TI The Biofine process: A biorefinery concept based on thermochemical conversion of biomass
AU Fitzpatrick, Stephen W.
CS Biofine Inc, Waltham, MA, 02451, USA
SO Abstracts of Papers, 227th ACS National Meeting, Anaheim, CA, United States, March 28-April 1, 2004 (2004), CELL-173 Publisher: American Chemical Society, Washington, D. C.
CODEN: 69FGKM

DT Conference; Meeting Abstract
LA English
AB Biofine has developed a fast thermochem. process for conversion of lignocellulosic biomass into useful platform chems. The primary fractions are: **levulinic** acid, (a highly versatile five carbon keto acid), **formic** acid, furfural (from the hemicellulosic fraction) and a carbonaceous char suitable for conversion to synthesis gas. **Levulinic** acid, produced in high yield in the process, can be converted into a wide range of environmentally acceptable chems. products including **gasoline** and diesel oxygenates, biodegradable polymers, environmentally benign pesticides, and solvents. The process can use feedstock from a wide range of sources including: paper sludge, waste paper, agricultural residues, municipal solid waste and wood waste. The use of cellulosic resources to produce chems. and **fuels** represents a zero or near-zero carbon dioxide production cycle since carbon dioxide is recycled within the biosphere. Economic anal. of the process suggests that the primary fractions can be produced in a price range competitive with other platform chems. presently used in the chemical industry but derived from fossil or petroleum sources.

L17 ANSWER 4 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinate esters from biomass wastes
AN 2001:412995 CAPLUS
DN 135:138980
TI Levulinate esters from biomass wastes
AU Olson, Edwin S.; Kjelden, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.
CS The Energy and Environmental Research Center, University of North Dakota, Grand Forks, ND, 58202-9018, USA
SO ACS Symposium Series (2001), 784(Chemicals and Materials from Renewable Resources), 51-63
CODEN: ACSMC8; ISSN: 0097-6156
PB American Chemical Society
DT Journal
LA English
AB The conversion of resin-bonded furniture and building waste to **levulinate** esters was studied with a view to producing **fuels**, solvents, and chemical intermediates and other useful byproducts in an inexpensive process. The acid-catalyzed reaction of cellulosic materials with ethanol or methanol at 200° gives good yields of **levulinate** and **formate** esters. A solid residue (charcoal) and a resinous lignin residue are also obtained. The excess alc. solvent is recycled. An advantage of the reaction in alc. is that wastewater is minimized and products are purified easily by distillation of the esters. Methanol and ethanol, which give the highest yields of **levulinate** esters, can be obtained at a low production cost. These esters are therefore the preferred intermediates for conversion to many other products. The Et ester was converted in high yield to a number of other esters by Fischer esterification. The resulting ketoesters are substrates for a variety of condensation and addition reactions at the ester and keto groups. A market for these higher-value products is needed to justify the process cost.
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 5 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN
TI Effect of organic acids on the growth and fermentation of ethanologenic Escherichia coli LY01
AN 1999:812596 CAPLUS
DN 132:150647
TI Effect of organic acids on the growth and fermentation of ethanologenic Escherichia coli LY01
AU Zaldivar, Jesus; Ingram, Lonnie O.
CS Inst. Food Agric. Sci., Univ. Florida, Gainesville, FL, 32611, USA
SO Biotechnology and Bioengineering (1999), 66(4), 203-210

CODEN: BIBIAU; ISSN: 0006-3592
PB John Wiley & Sons, Inc.
DT Journal
LA English
AB Hemicellulose residues can be hydrolyzed into a sugar syrup using dilute mineral acids. Although this syrup represents a potential feedstock for **biofuel** production, toxic compds. generated during hydrolysis limit microbial metabolism E. coli LY01, an ethanologenic biocatalyst engineered to ferment the mixed sugars in hemicellulose syrups, has been tested for resistance to selected organic acids that are present in hemicellulose hydrolyzates. Compds. tested include aromatic acids derived from lignin (ferulic, gallic, 4-hydroxybenzoic, syringic, and vanillic acids), acetic acid from the hydrolysis of acetylxylan, and others derived from sugar destruction (furoic, **formic**, **levulinic**, and caproic acids). Toxicity was related to hydrophobicity. Combinations of acids were roughly additive as inhibitors of cell growth. When tested at concns. that inhibited growth by 80%, none appeared to strongly inhibit glycolysis and energy generation or to disrupt membrane integrity. Toxicity was not markedly affected by inoculum size or incubation temperature The toxicity of all acids except gallic acid was reduced by an increase in initial pH (from pH 6.0 to pH 7.0 to pH 8.0). Together, these results are consistent with the hypothesis that both aliphatic and mononuclear organic acids inhibit growth and ethanol production in LY01 by collapsing ion gradients and increasing internal anion concns.
RE.CNT 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 6 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinate ester intermediates from biomass.
AN 1999:539847 CAPLUS
TI Levulinate ester intermediates from biomass.
AU Olson, Edwin S.; Kjelden, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.
CS Energy & Environmental Research Center, University of North Dakota, Grand Forks, ND, 58202-9018, USA
SO Book of Abstracts, 218th ACS National Meeting, New Orleans, Aug. 22-26 (1999), CELL-013 Publisher: American Chemical Society, Washington, D. C. CODEN: 67ZJA5
DT Conference; Meeting Abstract
LA English
AB The direct conversion of waste biomass to **levulinate** esters has been further investigated with the view to producing **fuels**, solvents, and chemical intermediates as well as other useful byproducts in an inexpensive process. The acid-catalyzed reaction of cellulosic materials with ethanol or methanol at 200C gives good yields of **levulinate** and **formate** esters. A solid residue (charcoal) and a resinous lignin residue are also obtained. The excess alc. solvent is recycled. An advantage of the reaction in alc. is that wastewater is minimized and products are purified easily by distillation of the esters. Methanol and ethanol give the highest yields of **levulinate** esters and can be obtained at low cost of production These esters are, therefore, preferred intermediates for conversion to many other products. The Et ester has been converted in high yield to a number of other esters by Fischer esterification. The resulting ketoesters are substrates for a variety of condensation and addition reactions at the ester and keto groups.

=> d his

(FILE 'HOME' ENTERED AT 06:45:04 ON 21 JUN 2006)

FILE 'CAPLUS' ENTERED AT 06:45:16 ON 21 JUN 2006
L1 1239 LEVULINATE
L2 41682 FORMATE
L3 47 L1 AND L2

```
L4         70183 GASOLINE
L5             4 FULS
L6        429770 FUEL
L7        379639 ?FUEL
L8        430585 L6 OR L7
L9        477388 L4 OR L8
L10            4 L3 AND L9
L11         4975 LEVULIN?
L12        79846 FORMIC OR FORMATE
L13          178 L11(L)L12
L14            8 L9 AND L13
L15       207935 ALKENE OR OLEFIN
L16            2 L14 AND L15
L17            6 L14 NOT L16

=> levulinic
L18        3959 LEVULINIC

=> l18(l)l15
L19           7 L18(L)L15

=> d l19 1-7 ti

L19  ANSWER 1 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinic acid esters and formate esters as gasoline and diesel fuel
     additives prepared from α-angelica lactone

L19  ANSWER 2 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinic and formic acid esters, as gasoline and diesel fuel
     oxygenate additives, prepared from biomass by hydrolysis and
     esterification with olefins

L19  ANSWER 3 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Catalytic Enantioselective [3 + 2]-Cycloadditions of Diazoketone-Derived
     Aryl-Substituted Carbonyl Ylides

L19  ANSWER 4 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Addition of nitrosyl chloride to olefins.  Synthesis of some chloro
     ketones

L19  ANSWER 5 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Stabilized olefin polymers

L19  ANSWER 6 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Amino sulfonic and amino carboxylic acids

L19  ANSWER 7 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Long chain alkoxy alkanol esters


=> d l19 7 ti fbib abs

L19  ANSWER 7 OF 7  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Long chain alkoxy alkanol esters
AN   1938:39762  CAPLUS
DN   32:39762
OREF 32:5534e-i,5535a
TI   Long chain alkoxy alkanol esters
IN   Graves, Geo. D.
PA   E. I. Du Pont de Nemours & Co.
DT   Patent
LA   Unavailable
FAN.CNT 1
     PATENT NO.          KIND   DATE        APPLICATION NO.        DATE
     ---------------     ----   --------    --------------------   --------
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PI US 2118506 19380524 US 1934-754309 19341122

AB Esters suitable for use as plasticizers with cellulose esters and ethers and with natural or synthetic resins are prepared by usual esterification methods, details being given of the production of the laurate of the monododecyl ether of ethylene glycol, a waxy product, the acetate of the monododecyl ether of ethylene glycol, the stearate of the monododecyl ether of diethylene glycol, a wax-like product m. 24°, the adipate of the monododecyl ether of ethylene glycol and the monododecyl ether of diethylene glycol, the phthalate of mixed monoalkyl ethers of ethylene glycol (a light colored oil), the oleate of the monododecyl ethers of ethylene glycol and diethylene glycol, and the levulinate of the monododecyl ether of ethylene glycol, and general mention is made of the similar production of esters from dihydric alcs. containing 2-22 C atoms, which can be prepared by carboxyl hydrogenation of the corresponding hydroxy acids, or by the addition of a mol. of water to the corresponding unsatd. monohydric alcs. They may also be produced by peracetylation of **olefins.** Many of these polyhydric alcs. may be treated with a long-chain alc. to form a monoether which is subsequently treated with the acids to prepare the esters. The alcs. which may be employed to form the monoalkyl ethers of dihydric alcs. embrace alcs. from vegetable oils by hydrogenation, e. g., the alcs. present in carboxyl hydrogenated coconut oil, the alcs. obtained from animal oils, such as sperm oil by carboxyl hydrogenation, naphthenyl alcs. by carboxyl hydrogenation of naphthenic acid, eleostearyl alc. by Na reduction of China-wood oil, linoleyl alc. by Na reduction of linseed oil, ricinoleyl alc. by Na reduction of castor oil, abietyl alc. by Na reduction of abietic acid, or the higher alcs. obtained in the methanol synthesis. Various acids are mentioned as suitable for use in the esterifications, including acetic, propionic, butyric, isobutyric, higher branched chain acids corresponding to the higher alcs. obtained in the MeOH synthesis, caprylic, lauric, **levulinic**, glycolic, lactic, methoxyacetic, oleic, succinic, adipic, maleic, benzoic, phthalic, benzoylbenzoic, chlorobenzoylbenzoic, naphthenic, hexahydrobenzoic, octahydrocinnamic, cyclohexylacetic and abietic acids (the methyl esters or acid chlorides of the acids also being suitable for the esterifications).

=> logoff hold

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	86.05	86.26

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-9.75	-9.75

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STN INTERNATIONAL SESSION SUSPENDED AT 07:39:11 ON 21 JUN 2006

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PASSWORD:
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FILE 'CAPLUS' ENTERED AT 07:58:01 ON 21 JUN 2006

COST IN U.S. DOLLARS	SINCE FILE	TOTAL

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FULL ESTIMATED COST                                   86.05      86.26

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)       SINCE FILE      TOTAL
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CA SUBSCRIBER PRICE                                   -9.75      -9.75

=> file reg
COST IN U.S. DOLLARS                             SINCE FILE      TOTAL
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FULL ESTIMATED COST                                   86.51      86.72

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)       SINCE FILE      TOTAL
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CA SUBSCRIBER PRICE                                   -9.75      -9.75

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DICTIONARY FILE UPDATES:  20 JUN 2006  HIGHEST RN 888507-19-5

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* the IDE default display format and the ED field has been added,   *
* effective March 20, 2005.  A new display format, IDERL, is now    *
* available and contains the CA role and document type information. *
*                                                                    *
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for details.

REGISTRY includes numerically searchable data for experimental and
predicted properties as well as tags indicating availability of
experimental property data in the original document.  For information
on property searching in REGISTRY, refer to:

http://www.cas.org/ONLINE/UG/regprops.html

=> e levulinic acid/cn
E1            1     LEVULINANILIDE, SEMICARBAZONE/CN
E2            1     LEVULINATE ION/CN
E3            1 --> LEVULINIC ACID/CN
E4            1     LEVULINIC ACID 1-PHENYLPIPERAZINE SALT/CN
E5            1     LEVULINIC ACID AMIDE/CN
E6            1     LEVULINIC ACID ANHYDRIDE/CN
E7            1     LEVULINIC ACID CHLORIDE/CN
E8            1     LEVULINIC ACID DIMETHYLAMIDE/CN
E9            1     LEVULINIC ACID ETHYL ESTER SEMICARBAZONE/CN
E10           1     LEVULINIC ACID HYDRAZONE/CN
E11           1     LEVULINIC ACID NITRILE/CN
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E12          1     LEVULINIC ACID OXIME/CN

=> e3
L20          1 "LEVULINIC ACID"/CN

=> d l20

L20  ANSWER 1 OF 1  REGISTRY  COPYRIGHT 2006 ACS on STN
RN   123-76-2  REGISTRY
ED   Entered STN:  16 Nov 1984
CN   Pentanoic acid, 4-oxo- (9CI)  (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN   Levulinic acid (8CI)
OTHER NAMES:
CN   β-Acetylpropionic acid
CN   γ-Ketovaleric acid
CN   3-Acetylpropionic acid
CN   4-Ketovaleric acid
CN   4-Oxopentanoic acid
CN   4-Oxovaleric acid
CN   Laevulinic acid
CN   Levulic acid
CN   NSC 3716
FS   3D CONCORD
MF   C5 H8 O3
CI   COM
LC   STN Files:   AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN*, BIOSIS, BIOTECHNO, CA,
       CABA, CAOLD, CAPLUS, CASREACT, CBNB, CHEMCATS, CHEMINFORMRX, CHEMLIST,
       CIN, CSCHEM, DDFU, DETHERM*, DRUGU, EMBASE, GMELIN*, IFICDB, IFIPAT,
       IFIUDB, IPA, MEDLINE, MRCK*, MSDS-OHS, NAPRALERT, PIRA, PROMT, PS,
       RTECS*, SPECINFO, SYNTHLINE, TOXCENTER, TULSA, USAN, USPAT2, USPATFULL,
       VTB
         (*File contains numerically searchable property data)
     Other Sources:   DSL**, EINECS**, TSCA**
         (**Enter CHEMLIST File for up-to-date regulatory information)
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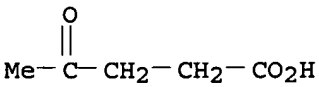

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**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

            2375 REFERENCES IN FILE CA (1907 TO DATE)
              92 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
            2382 REFERENCES IN FILE CAPLUS (1907 TO DATE)
               3 REFERENCES IN FILE CAOLD (PRIOR TO 1967)


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COST IN U.S. DOLLARS                            SINCE FILE      TOTAL
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DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)      SINCE FILE      TOTAL
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CA SUBSCRIBER PRICE                                0.00       -9.75

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FILE COVERS 1907 - 21 Jun 2006 VOL 144 ISS 26
FILE LAST UPDATED: 20 Jun 2006 (20060620/ED)


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=> l20/prep
          2382 L20
       3485484 PREP/RL
L21         298 L20/PREP
                  (L20 (L) PREP/RL)

=> biomass
         67966 BIOMASS
           844 BIOMASSES
L22      68252 BIOMASS
                  (BIOMASS OR BIOMASSES)

=> l21 and l22
L23          26 L21 AND L22

=> d l23 16-26 ti

L23  ANSWER 16 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Some present research trends in the field of chemical processing of wood
     biomass and brown coals

L23  ANSWER 17 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   A new approach for the production of 2,5-furandicarboxylic acid by in situ
     oxidation of 5-hydroxymethylfurfural starting from fructose

L23  ANSWER 18 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Method for the production of levulinic acid and its derivatives

L23  ANSWER 19 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Production of levulinic acid and use as a platform chemical for derived
     products

L23  ANSWER 20 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Hydrolytic method for the production of levulinic acid and its derivatives
     from biomass and sugars

L23  ANSWER 21 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Chemical use of biomass. Part II. Kinetics of acid hydrolysis of
     cellulose

L23  ANSWER 22 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Cryo-hydrolysis of plant biomass

L23  ANSWER 23 OF 26  CAPLUS  COPYRIGHT 2006 ACS on STN
```

TI Chemical processing of **biomass**. II. Production of levulinic acid by acidic hydrolysis of plant materials

L23 ANSWER 24 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI **Biomass** derived levulinic acid derivatives and their use as liquid fuel extenders

L23 ANSWER 25 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Photoinduced electron transfer cleavage of lignocellulosics

L23 ANSWER 26 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Chemical comparisons of liquid fuel produced by thermochemical liquefaction of various **biomass** materials

=> d l23 18, 19,20,23,24, 26 ti fbib abs

L23 ANSWER 18 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Method for the production of levulinic acid and its derivatives
AN 2000:271956 CAPLUS
DN 132:280727
TI Method for the production of levulinic acid and its derivatives
IN Farone, William A.; Cuzens, John E.
PA Arkenol, Inc., USA
SO U.S., 13 pp., Cont.-in-part of U.S. 5,892,107.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
PI	US 6054611	A	20000425	US 1998-76941		19980513
				US 1996-747441	A2	19961108
	US 5892107	A	19990406	US 1996-747441		19961108
	ZA 9710038	A	19980701	ZA 1997-10038		19971107
				US 1996-747441	A	19961108

PATENT FAMILY INFORMATION:
FAN 1998:323227

	PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
PI	WO 9819986	A1	19980514	WO 1997-US20127		19971104
	W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM					
	RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG					
				US 1996-747441	A	19961108
	US 5892107	A	19990406	US 1996-747441		19961108
	AU 9851678	A1	19980529	AU 1998-51678		19971104
				US 1996-747441	A	19961108
				WO 1997-US20127	W	19971104
	EP 937024	A1	19990825	EP 1997-946522		19971104
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI					
				US 1996-747441	A	19961108
				WO 1997-US20127	W	19971104
	ZA 9710038	A	19980701	ZA 1997-10038		19971107
				US 1996-747441	A	19961108

AB A method of producing dehydration products from one more 5-carbon or 6-carbon sugars includes reacting said one or more sugars at 40-240° for 1 to 96 h in the presence of 5-90% sulfuric acid, separating the reaction products, and recovering levulinic acid. The sugars are can

be generated from strong acid hydrolysis of **biomass**, such as rice straw, paper, cotton and other cellulosic materials.
RE.CNT 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 19 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Production of levulinic acid and use as a platform chemical for derived products
AN 1999:713367 CAPLUS
DN 132:38007
TI Production of levulinic acid and use as a platform chemical for derived products
AU Elliott, D. C.; Fitzpatrick, S. W.; Bozell, J. J.; Jarnefeld, J. L.; Bilski, R. J.; Moens, L.; Frye, J. G., Jr.; Wang, Y.; Neuenschwander, G. G.
CS Pacific Northwest National Laboratory, Richland, WA, 99352, USA
SO Biomass: A Growth Opportunity in Green Energy and Value-Added Products, Proceedings of the Biomass Conference of the Americas, 4th, Oakland, Calif., Aug. 29-Sept. 2, 1999 (1999), Volume 1, 595-600. Editor(s): Overend, Ralph P.; Chornet, Esteban. Publisher: Elsevier Science, Oxford, UK.
CODEN: 68IQAG
DT Conference
LA English
AB Levulinic acid (LA) can be produced cost effectively and in high yields from renewable cellulosics. The technol. to convert cellulosic **biomass** to LA is being demonstrated on a 1 ton/day scale using paper mill sludge and municipal solid waste as the feedstock. Low cost LA has great possibilities as a platform chemical for the production of a wide range of value-added product chems. For example, a process developed at Pacific Northwest National Laboratory produces methyltetrahydrofuran (MTHF) from LA in > 80% molar yield by a single-stage catalytic hydrogenation process. MTHF may be used as a solvent and as a fuel. In other work, the National Renewable Energy Laboratory has developed a new preparation of δ-aminolevulinic acid (DALA), a broad spectrum herbicide, from LA. Each reaction step proceeds in high (> 80%) yield and affords DALA in greater than 90% purity, giving a process that could be com. viable. LA is also being investigated at Rensselaer Polytechnic Institute as a starting material for the production of diphenolic acid, a direct replacement for bisphenol A in several com. polymers.
RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 20 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Hydrolytic method for the production of levulinic acid and its derivatives from **biomass** and sugars
AN 1998:323227 CAPLUS
DN 128:323154
TI Hydrolytic method for the production of levulinic acid and its derivatives from **biomass** and sugars
IN Farone, William A.; Cuzens, John E.
PA Arkenol, Inc., USA
SO PCT Int. Appl., 26 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 9819986	A1	19980514	WO 1997-US20127	19971104
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ,				

LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG

			US 1996-747441	A	19961108
US 5892107	A	19990406	US 1996-747441		19961108
AU 9851678	A1	19980529	AU 1998-51678		19971104
			US 1996-747441	A	19961108
			WO 1997-US20127	W	19971104
EP 937024	A1	19990825	EP 1997-946522		19971104
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI					
			US 1996-747441	A	19961108
			WO 1997-US20127	W	19971104
ZA 9710038	A	19980701	ZA 1997-10038		19971107
			US 1996-747441	A	19961108

PATENT FAMILY INFORMATION:

FAN 2000:271956

PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
PI US 6054611	A	20000425	US 1998-76941		19980513
			US 1996-747441	A2	19961108
US 5892107	A	19990406	US 1996-747441		19961108
ZA 9710038	A	19980701	ZA 1997-10038		19971107
			US 1996-747441	A	19961108

AB Levulinic acid and its derivs. (e.g., fumaric acid, maleic acid, etc.) are prepared in high yield and selectivity by mixing **biomass** (e.g., cotton, straw, etc.) containing cellulose and hemicellulose with a solution of 25-90% acid (e.g., H2SO4) to form a liquid-solid gel, diluting the formed gel to an acid concentration of 20-30%, heating the mixture to 80-100°, separating the liquid portion from the solid portion to produce a 1st liquid containing a sugar-acid mixture, mixing the separated solid portion with 25-90% acid to an acid concentration of 20-30%, heating the solid mixture to 80-100° to promote further cellulose and hemicellulose hydrolysis, separating a 2nd liquid portion containing a sugar-acid mixture, combining the 1st and 2nd liquid potions, heating the combined liqs. to 40-240° for 1-96 h, separating the reaction products, and recovering the levulinic acid. Process flow diagrams are presented.

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 23 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN

TI Chemical processing of **biomass**. II. Production of levulinic acid by acidic hydrolysis of plant materials

AN 1990:200905 CAPLUS

DN 112:200905

TI Chemical processing of **biomass**. II. Production of levulinic acid by acidic hydrolysis of plant materials

AU Szokonya, L.; Kovacs, M.; Marton, G.; Havas-Dencs, J.

CS Dep. Chem. Process Eng., Veszprem Univ. Chem. Eng., Veszprem, Hung.

SO Hungarian Journal of Industrial Chemistry (1989), 17(4), 477-90
CODEN: HJICAI; ISSN: 0133-0276

DT Journal

LA English

AB The desired main product of acid hydrolysis of the cellulose parts of plant materials can be varied by the appropriate selection of the operation parameters. In the case of industrial-scale cellulose hydrolysis, the diffusion rates of the products formed should be taken into consideration. A math model was developed in order to describe cellulose hydrolysis accompanied by diffusion. The parameters of the solution functions of the math. model were identified by the Nelder-Mead optimization method by using exptl. kinetic curves.

L23 ANSWER 24 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI **Biomass** derived levulinic acid derivatives and their use as liquid fuel extenders
AN 1986:517735 CAPLUS
DN 105:117735
TI **Biomass** derived levulinic acid derivatives and their use as liquid fuel extenders
AU Thomas, John J.; Barile, Ronald G.
CS Med. Res. Inst., Florida Inst. Technol., Melbourne, FL, 32901, USA
SO Biomass Energy Dev., [Proc. South. Biomass Energy Res. Conf.], 3rd (1986), Meeting Date 1985, 333-48. Editor(s): Smith, Wayne H. Publisher: Plenum, New York, N. Y.
CODEN: 55DMAF
DT Conference
LA English
AB In the manufacture of levulinic acid derivs. (I) by hydrolysis of cellulose-containing **biomass**, optimum yields are attained when newspapers are used as the feedstock; computer paper and sawdust give lower yields. H2SO4 assures higher yields than HCl. Reaction time >3 h are required. I are of interest as a gasoline extenders.

L23 ANSWER 26 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Chemical comparisons of liquid fuel produced by thermochemical liquefaction of various **biomass** materials
AN 1984:9917 CAPLUS
DN 100:9917
TI Chemical comparisons of liquid fuel produced by thermochemical liquefaction of various **biomass** materials
AU Russell, J. A.; Molton, P. M.; Landsman, S. D.
CS Pac. Northwest Lab., Richland, WA, 99352, USA
SO Altern. Energy Sources (1983), Volume Date 1980, 3(3), 307-22
CODEN: ALESDK; ISSN: 0278-1662
DT Journal
LA English
AB Liquefaction of **biomass** in aqueous alkali at ≤350° is an effective way to convert solid wastes to liquid fuels. Liquefaction oils from several forms of **biomass** differing in proportions of cellulose, hemicellulose, lignin, protein, and minerals were studied and their chemical compns. were compared. The proportions of chemical components varied considerably depending on the type of **biomass** liquefied. However, all the oils, even those produced from cellulose, had similar chemical characteristics due to the presence of significant quantities of phenols. These phenols are at least partly responsible for the corrosivity and viscosity commonly associated with **biomass** oils. The differences in chemical component distribution in the various **biomass** oils might successfully be exploited if the oil is to be used as a chemical feedstock. If the oil is to be used as a fuel, however, then reaction conditions will be a more important consideration than the source of **biomass.**

=> d l23 1-15 ti

L23 ANSWER 1 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Product Identification and Distribution from Hydrothermal Conversion of Walnut Shells

L23 ANSWER 2 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Composition of Products from the Supercritical Water Gasification of Glucose: A Model **Biomass** Compound

L23 ANSWER 3 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinic acid esters and formate esters as gasoline and diesel fuel additives prepared from α-angelica lactone

L23 ANSWER 4 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI The Biofine technology - a "bio-refinery" concept based on thermochemical conversion of cellulosic **biomass** to fuels and chemicals

L23 ANSWER 5 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Review on preparation methods of levulinic acid, a new platform chemical

L23 ANSWER 6 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI The water hyacinth as a renewable feedstock for green (bulk) chemicals

L23 ANSWER 7 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Evaluation of the detoxification of brewery's spent grain hydrolysate for xylitol production by Debaryomyces hansenii CCMI 941

L23 ANSWER 8 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinic acid. A highly versatile chemical product from papermaking sludge and from **biomass**

L23 ANSWER 9 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Kinetics of glucose decomposition during dilute-acid hydrolysis of lignocellulosic **biomass**

L23 ANSWER 10 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Optimization of brewery's spent grain dilute-acid hydrolysis for the production of pentose-rich culture media

L23 ANSWER 11 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Production of glucosamine from spent fungal fermentation **biomass**

L23 ANSWER 12 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Influence of the Heating Rate and the Type of Catalyst on the Formation of Key Intermediates and on the Generation of Gases During Hydropyrolysis of Glucose in Supercritical Water in a Batch Reactor

L23 ANSWER 13 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Levulinic and formic acid esters, as gasoline and diesel fuel oxygenate additives, prepared from **biomass** by hydrolysis and esterification with olefins

L23 ANSWER 14 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Experimental research on the bio-energy conversion technology

L23 ANSWER 15 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI **Biomass** conversion in water at 330-410°C and 30-50 MPa. Identification of Key Compounds for Indicating Different Chemical Reaction Pathways

=> d l23 14 ti fbib abs

L23 ANSWER 14 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Experimental research on the bio-energy conversion technology
AN 2003:252575 CAPLUS
DN 139:152159
TI Experimental research on the bio-energy conversion technology
AU Mei, Lu; Li, Meiling; Xu, Baojiang
CS College of Power Engineering, University of Shanghai for Science and Technology, Shanghai, 200093, Peop. Rep. China
SO Chinese Journal of Mechanical Engineering (English Edition) (2002), 15(Suppl.), 43-47
CODEN: CJMEER
PB China Machine Press
DT Journal
LA English

AB **Biomass** is a potential renewable energy source. The small-scale liquefaction of **biomass** by flash pyrolysis was studied and new equipment was developed. The mass and energy balance of the process as well as the design of the system that includes feeding, reaction, and production collection, were completed. Bio-oil was produced and analyzed by GC-MS.
RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> dcost
0 DCOST
L24 0 DCOST

=> d cost

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
CONNECT CHARGES	8.40	28.53
NETWORK CHARGES	1.26	4.32
SEARCH CHARGES	5.85	34.01
DISPLAY CHARGES	41.30	83.77
FULL ESTIMATED COST	56.81	150.63

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-5.25	-15.00

IN FILE 'CAPLUS' AT 08:11:28 ON 21 JUN 2006

=> logoff hold

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	56.81	150.63

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-5.25	-15.00

SESSION WILL BE HELD FOR 60 MINUTES
STN INTERNATIONAL SESSION SUSPENDED AT 08:11:35 ON 21 JUN 2006

Connecting via Winsock to STN

Welcome to STN International! Enter x:x

LOGINID:SSSPTA1623PAZ

PASSWORD:
* * * * * * RECONNECTED TO STN INTERNATIONAL * * * * * *
SESSION RESUMED IN FILE 'CAPLUS' AT 08:49:58 ON 21 JUN 2006
FILE 'CAPLUS' ENTERED AT 08:49:58 ON 21 JUN 2006

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	56.81	150.63

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-5.25	-15.00

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     (FILE 'HOME' ENTERED AT 06:45:04 ON 21 JUN 2006)

     FILE 'CAPLUS' ENTERED AT 06:45:16 ON 21 JUN 2006
L1          1239 LEVULINATE
L2         41682 FORMATE
L3            47 L1 AND L2
L4         70183 GASOLINE
L5             4 FULS
L6        429770 FUEL
L7        379639 ?FUEL
L8        430585 L6 OR L7
L9        477388 L4 OR L8
L10            4 L3 AND L9
L11         4975 LEVULIN?
L12        79846 FORMIC OR FORMATE
L13          178 L11(L)L12
L14            8 L9 AND L13
L15       207935 ALKENE OR OLEFIN
L16            2 L14 AND L15
L17            6 L14 NOT L16
L18         3959 LEVULINIC
L19            7 L18(L)L15

     FILE 'REGISTRY' ENTERED AT 07:58:19 ON 21 JUN 2006
                E LEVULINIC ACID/CN
L20            1 E3

     FILE 'CAPLUS' ENTERED AT 07:58:58 ON 21 JUN 2006
L21          298 L20/PREP
L22        68252 BIOMASS
L23           26 L21 AND L22
L24            0 DCOST

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L25            1 L21(L)L15

=> d l25

L25  ANSWER 1 OF 1  CAPLUS  COPYRIGHT 2006 ACS on STN
AN   2003:818512  CAPLUS
DN   139:294305
TI   Levulinic and formic acid esters, as gasoline and diesel fuel oxygenate
     additives, prepared from biomass by hydrolysis and esterification with
     olefins
IN   Fagan, Paul Joseph; Korovessi, Ekaterini; Manzer, Leo E.; Mehta, Rakesh;
     Thomas, Stuart M.
PA   E. I. Du Pont de Nemours & Co., USA
SO   PCT Int. Appl., 28 pp.
     CODEN: PIXXD2
DT   Patent
LA   English
FAN.CNT 1
     PATENT NO.           KIND   DATE        APPLICATION NO.         DATE
     --------------       ----   --------    --------------------    --------
PI   WO 2003085071         A1    20031016    WO 2003-US9853          20030401
         W:  AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,
             CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
             GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
             LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM,
             PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT,
             TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
         RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,
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            FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR,
            BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
     CA 2479531          AA    20031016    CA 2003-2479531        20030401
     AU 2003224812       A1    20031020    AU 2003-224812         20030401
     US 2003233011       A1    20031218    US 2003-404322         20030401
     EP 1490457          A1    20041229    EP 2003-721503         20030401
        R:  AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
            IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK
     US 2005118691       A1    20050602    US 2003-507062         20030401
     CN 1643116          A     20050720    CN 2003-807436         20030401
     JP 2005521748       T2    20050721    JP 2003-582252         20030401
PRAI US 2002-369380P     P     20020401
     WO 2003-US9853      W     20030401
OS   MARPAT 139:294305
RE.CNT  4     THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
              ALL CITATIONS AVAILABLE IN THE RE FORMAT


=> l21 and l15
L26           6 L21 AND L15

=> l26 not l25
L27           5 L26 NOT L25

=> d l27 1-5 ti

L27  ANSWER 1 OF 5  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Levulinic acid esters and formate esters as gasoline and diesel fuel
     additives prepared from α-angelica lactone

L27  ANSWER 2 OF 5  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Acylated nitrogen-based fouling control agents by reaction of amines with
     acylcarboxylic acids and alkenes

L27  ANSWER 3 OF 5  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Hydroxy-substituted monolactones useful as intermediates for preparing
     lubricating oil and fuel additives

L27  ANSWER 4 OF 5  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Chromic acid oxidation of some oxiranes

L27  ANSWER 5 OF 5  CAPLUS  COPYRIGHT 2006 ACS on STN
TI   Palladium(II)-catalyzed carboxylation reactions of olefins:
     scope and utility


=> logoff hold
COST IN U.S. DOLLARS                              SINCE FILE      TOTAL
                                                    ENTRY     SESSION
FULL ESTIMATED COST                                 61.44      155.26

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)        SINCE FILE      TOTAL
                                                    ENTRY     SESSION
CA SUBSCRIBER PRICE                                 -5.25      -15.00

 SESSION WILL BE HELD FOR 60 MINUTES
STN INTERNATIONAL SESSION SUSPENDED AT 08:52:38 ON 21 JUN 2006
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